

1. Many teens have posted profiles on a social-networking Web site. A sample survey asked random samples of teens with online profiles if they included false information in their profiles. Of 170 younger teens (ages 12 to 14), 117 said "Yes." Of 317 older teens (ages 15 to 17), 152 said "Yes."

(a) Do these samples satisfy the guidelines for the large-sample confidence interval?

(b) Give a 95% confidence interval for the difference between the proportions of younger and older teens who include false information in their online profiles.

2. Subjects with preexisting cardiovascular symptoms who were receiving subitramine, an appetite suppressant, were found to be at increased risk of cardiovascular events while taking the drug. The study included 9804 overweight or obese subjects with preexisting cardiovascular disease and/or type 2 diabetes. The subjects were randomly assigned to subitramine (4906 subjects) or a placebo (4898 subjects) in a double-blind fashion. The primary outcome measured was the occurrence of any of the following events: nonfatal myocardial infarction or stroke, resuscitation after cardiac arrest, or cardiovascular death. The primary outcome was observed in 561 subjects in the subitramine group and 490 subjects in the placebo group.

(a) Find the proportion of subjects experiencing the primary outcome for both the subitramine and placebo groups.

(b) Can we safely use the large-sample confidence interval for comparing the proportions of subitramine and placebo subjects who experienced the primary outcome? Explain.

(c) Give a 95% confidence interval for the difference between the proportions of subitramine and placebo subjects who experienced the primary outcome.

3. Genetic influences on cancer can be studied by manipulating the genetic makeup of mice. One of the processes that turn genes on or off (so to speak) in particular locations is called "DNA methylation." Do low levels of this process help cause tumors? Compare mice altered to have low levels with normal mice. Of 33 mice with lowered levels of DNA methylation, 23 developed tumors. None of the control group of 18 normal mice developed tumors in the same time period.

(a) Explain why we cannot safely use either the large-sample confidence interval or the test for comparing the proportions of normal and altered mice that develop tumors.

(b) The plus four method adds two observations, a success and a failure, to each sample. What are the sample sizes and the numbers of mice with tumors after you do this?

(c) Give a 99% confidence interval for the difference in the proportions of the two populations that develop tumors.

4. Research has suggested that musicians process music in the same cortical regions in which adolescents process algebra. When taking introductory algebra, will students who were enrolled in formal instrumental or choral music instruction during middle school outperform those who experienced neither of these modes of musical instruction? The sample consisted of 6026 ninth-grade students in Maryland who had completed introductory algebra. Of these, 3239 students had received formal instrumental or choral instruction during all three years of middle school, while the remaining students had not. Of those receiving formal musical instruction, 2818 received a passing grade on the Maryland Algebra/Data Analysis High School Assessment (HSA). In contrast, 2091 of the 2787 students not receiving musical instruction received a passing grade.

Give a 95% confidence interval for the difference between the proportions of students passing the HSA who have received or not received formal musical instruction in middle school.

5. North Carolina State University looked at the factors that affect the success of students in a required chemical engineering course. Students must get a C or better in the course to continue as chemical engineering majors, so a "success" is a grade of C or better. There were 65 students from urban or suburban backgrounds, and 52 of these students succeeded. Another 55 students were from rural or small-town backgrounds; 30 of these students succeeded in the course. Is there good evidence that the proportion of students who succeed is different for urban/suburban versus rural/small-town backgrounds?

6. North Carolina State University looked at the factors that affect the success of students in a required chemical engineering course. Students must get a C or better in the course to continue as chemical engineering majors, so a "success" is a grade of C or better. There were 65 students from urban or suburban backgrounds, and 52 of these students succeeded. Another 55 students were from rural or small-town backgrounds; 30 of these students succeeded in the course.

The North Carolina State University study also looked at possible differences in the proportions of female and male students who succeeded in the course. They found that 23 of the 34 women and 60 of the 89 men succeeded. Is there evidence of a difference between the proportions of women and men who succeed?

7. Chantix is different from most other quit-smoking products in that it targets nicotine receptors in the brain, attaches to them, and blocks nicotine from reaching them. As part of a larger randomized controlled trial, generally healthy smokers who smoked at least 10 cigarettes per day were assigned at random to take Chantix or a placebo. The study was double-blind, with the response measure being continuous absence from smoking for Weeks 9 through 12 of the study. Of the 352 subjects taking Chantix, 155 abstained from smoking during Weeks 9 through 12, while 61 of the 344 subjects taking the placebo abstained during this same time period. Give a 99% confidence interval for the difference (treatment minus placebo) in the proportions of smokers who abstained from smoking during Weeks 9 through 12.

8. Do our emotions influence economic decisions? One way to examine the issue is to have subjects play an "ultimatum game" against other people and against a computer. Your partner (person or computer) gets \$10, on the condition that it be shared with you. The partner makes you an offer. If you refuse, neither of you gets anything. So it's to your advantage to accept even the unfair offer of \$2 out of the \$10. Some people get mad and refuse unfair offers. Here are data on the responses of 76 subjects randomly assigned to receive an offer of \$2 from either a person they were introduced to or a computer:

	Accept	Reject
Human Offers	20	18
Computer Offers	32	6

We suspect that emotion will lead to offers from another person being rejected more often than offers from an impersonal computer. Do a test to assess the evidence for this conjecture.

9. Hand disinfection is frequently recommended for prevention of transmission of the rhinovirus that causes the common cold. In particular, hand lotion containing 2% citric acid and 2% malic acid in 70% ethanol (HL+) has been found to have both immediate and persistent ability to inactivate rhinovirus (RV) on the hands in an experimental setting. Is hand disinfection effective in reducing the risk of infection in a natural setting? A total of 212 volunteers were assigned at random to either the HL+ group, which used the hand lotion every three hours or after hand washing, and a control group, which was asked to use routine hand washing but to avoid the use of alcohol-based hand sanitizers. Here are the data on the numbers of subjects with and without RV infection in the two groups over the 10-week study period:

	Infected	Not Infected
HL+	49	67
Control Group	49	47

10. How accurate are the tests that grain-handling facilities make to detect the presence of genetically modified (GM) soybeans in shipments to countries that do not allow GM beans? Batches of soybeans containing some genetically modified (GM) beans were submitted to 23 grain-handling facilities. When batches contained 1% of GM beans, 18 of the facilities detected the presence of GM beans. Only 7 of the facilities detected GM beans when they made up one-tenth of 1% of the beans in the batches. Explain why we CANNOT use the methods of this chapter to compare the proportions of facilities that will detect the two levels of GM soybeans.